(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 August 2001 (23.08.2001)

PCT

(10) International Publication Number
WO 01/061978 A3

(51) International Patent Classification[7]: H04M 3/436, H04Q 3/00

(21) International Application Number: PCT/US01/04775

(22) International Filing Date: 15 February 2001 (15.02.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/506,093 17 February 2000 (17.02.2000) US

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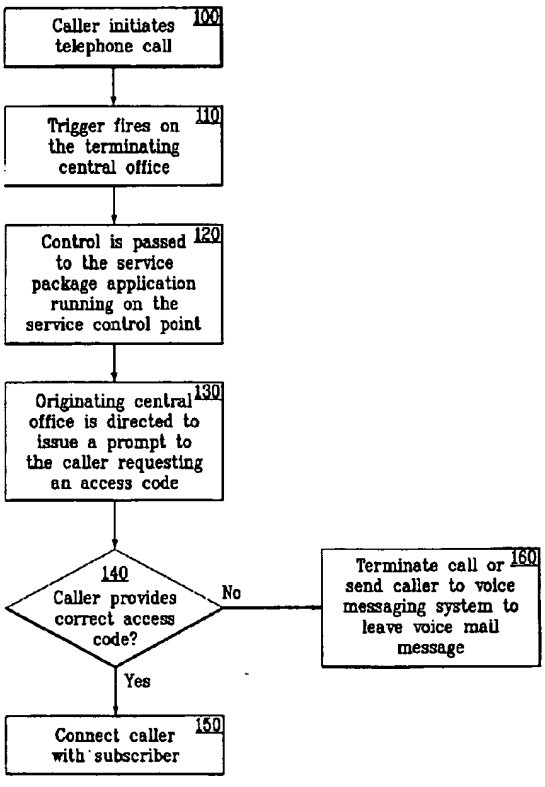
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian

[Continued on next page]

(54) Title: CALL SCREENING THAT PROMPTS CALLER FOR AN ACCESS CODE



(57) Abstract: A "do not disturb" (DND) telephone subscriber feature is provided that prompts a caller for an access code, such as a personal identification number (PIN), and based on the caller's inputted response, determines whether to complete the call to a subscriber. If the caller enters a valid code, then the call is placed to the subscriber's phone. Otherwise, the system hangs up, or alternately, sends the caller to a voice messaging system so that the caller can leave a voice message for the subscriber.

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patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
with international search report

(88) Date of publication of the international search report:
29 August 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

DO NOT DISTURB PRIVACY MANAGER SUBSCRIBER FEATURE WITHIN A TELECOMMUNICATIONS NETWORK

FIELD OF THE INVENTION

The present invention relates in general to a subscriber feature within a telecommunications network. More particularly, the present invention relates to a "do not disturb" subscriber feature to protect the privacy of a subscriber within such a network.

BACKGROUND OF THE INVENTION

In telecommunications systems, so-called nuisance calls continue to be a problem. These nuisance calls may originate, for example, from a telemarketer, an incorrectly dialed number, a threatening or harassing caller, or a caller who merely calls at an inconvenient time. With developments in telephones and telecommunications systems, many approaches have been employed to reduce or eliminate calls from unwanted callers and/or calls at particular times.

One prior art approach to such nuisance or inconvenience calls has been for the subscriber to place the telephone "off-hook." Such an approach, however, may be dangerous and may present difficulties for the telephone service provider. For example, by placing the receiver off-hook, the telephone cannot receive any outside calls, even emergency calls. Furthermore, the telephone, when placed off-hook, may generate an annoying buzzing noise, usually followed by a recorded announcement. This noise and announcement are usually generated by the telephone service provider to

encourage the telephone user to place the handset on-hook, as an off-hook handset may unnecessarily tie up telephone switching equipment. For this reason, a receiver which is off-hook may be disconnected from the switching point of a telephone system after the receiver has been off-hook for a predetermined amount of time. In some systems, the receiver may not be reconnected immediately after being placed on-hook, and thus the telephone is unavailable to the subscriber for a period of time after being placed on-hook. As a result, calls cannot be made during this time period, which is potentially disastrous in an emergency situation where the telephone is needed (e.g., police, fire, or medical emergency).

As described, placing the receiver off-hook serves to shut off the telephone receiver, thereby blocking all incoming calls. To overcome this difficulty, some subscribers have resorted to commercially available telephone answering machines to provide call screening. An answering machine is generally provided with a speaker, allowing the subscriber to hear the voice of the caller. The subscriber can then selectively pick up the receiver and talk to the caller once the caller has been identified. This approach has several disadvantages. All calls including nuisance calls will ring the subscriber's phone, thereby interrupting the subscriber. Further, the subscriber must still go to the phone (or in this case, answering machine) and listen to the voice of the caller and determine whether to take the call, and thus manually screen the calls.

Telephone companies have begun to offer a calling line ID service that allows a subscriber to see the number of the caller, and perhaps his name. If the subscriber wishes to take the call, he picks up the phone; otherwise, the call goes unanswered and may be transferred to a messaging system after a number of rings. Unfortunately, such a service does not prevent the telephone from ringing, thereby disturbing the subscriber with a potential nuisance call.

Further, if a known caller calls from a different number, the subscriber will not recognize the caller from the

number displayed by the calling line ID system. In addition, long distance calls or calls from pay phones may not display a calling line ID number on the subscriber's display. Finally, such a system does not effectively distinguish emergency calls from ordinary calls. Thus, a subscriber may inadvertently screen out an important emergency call if the number on the calling line ID screen is not recognized.

Other conventional terminating call treatments include call forwarding variable where all or selected incoming calls are directly forwarded to a predefined forward-to-number; call forwarding busy where all or selected incoming calls toward a busy called party subscriber are forwarded to a predefined forward-to number; or anonymous call rejection where an incoming call connection to the subscriber is denied if the caller refuses to provide his calling line ID. A service called Privacy Manager is currently provided by Ameritech Corp., of Chicago, Illinois and / or its subsidiaries. This service determines if the caller has a missing or blocked calling line ID. If so, the caller is prompted to either unblock the calling line ID or record his name. If the caller refuses, the caller is not connected with the subscriber

Although the art of telephone call screening devices is considerable, there remain some problems inherent in this technology. Therefore, a need exists for a system and method that allows a subscriber to screen out nuisance or inconvenient calls, while still allowing the subscriber full access to the telephone for desired incoming calls, emergency calls, and outgoing calls.

SUMMARY OF THE INVENTION

The present invention is directed to a "do not disturb" ("DND") telephone subscriber feature on a telephone system that prompts a caller for an access code, such as a personal identification number ("PIN"), and based on the caller's inputted response, determines whether to complete the call to a subscriber. If the caller enters a valid code, the call is placed to the subscriber's phone. Otherwise, the

system hangs up, or alternately, sends the caller to a voice messaging system so that the caller can leave a voice message for the subscriber.

According to one aspect of the invention, the subscriber can activate / deactivate the DND feature by dialing a code on his telephone, such as *99. Alternately, the feature can be automatically activated / deactivated at pre-set times.

According to further aspects of the invention, each caller can have a unique access code, or some or all the callers can share an access code. Thus, flexibility is provided to the subscriber in maintaining access codes corresponding to a list of callers who have the ability to connect to the subscriber's telephone when the DND feature is activated.

The foregoing and other aspects of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a simplified schematic diagram of a telecommunications network including local telephone sets and their associated central offices, a service control point, a voice messaging system, and a service package application in accordance with an embodiment of the present invention; and

Fig. 2 shows a flow chart of an exemplary method of operation of the system of Fig. 1 in accordance with the present invention.

DESCRIPTION OF EXEMPLARY EMBODIMENTS AND BEST MODE

For the purposes of this application, the term "subscriber" is used to mean a subscriber to a telephone service and generally refers to the party being called, and the term "caller" is used to designate a party calling the subscriber. As used in the present specification, the term "PIN" or "personal identification number" means a number which may be assigned to one or more callers. Thus, a PIN may or may

not be personal.

With developments and improvements in telecommunications networks, subscribers are able to instruct serving telecommunications networks or exchanges to provide user-specific subscriber features. A "do not disturb" (DND) subscriber feature in accordance with the present invention can be implemented as one of these subscriber features. By activating the DND subscriber feature, the associated subscriber is able to block or deny incoming call connections unless the caller provides a valid access code or PIN.

Referring now to the figures, one embodiment of the system and method of the present invention will be described. For purposes of this description, it is assumed that the reader is familiar with basic telephony concepts and terminology.

Reference is now made to Fig. 1 illustrating an exemplary telecommunication network 10 that connects a call between a caller 20 and a subscriber 80 in accordance with the present invention. This exemplary environment is the public switched telecommunication network (PSTN). A portion of the PSTN is illustrated in Fig. 1 and generally described below.

In particular, the detailed portion of the PSTN illustrates a part of the AIN of a typical local exchange carrier. For brevity, only a basic explanation of the PSTN is provided herein. Where the PSTN operates or is composed differently in an important aspect from that which would be understood by those skilled in the art, additional details are provided herein. For further information regarding the referenced PSTN and AIN aspects thereof, the interested reader is referred to the patent to *Weisser*, U.S. Patent No. 5,430,719, which is incorporated herein by reference.

The AIN includes a variety of interconnected network elements. A group of such network elements includes the plurality of central offices 30, 70 which are service switching points (SSPs). A central office or SSP is a switch and the terms are used interchangeably herein. As further illustrated in Fig. 1, the SSPs 30, 70 have a plurality of subscriber lines 15 connected thereto. A subscriber line may also be referred

to as a calling line. Each SSP serves a designated group of calling lines, and thus, the SSP or switch that serves a particular calling line may be referred to as its serving switch. Each calling line is connected typically to a piece of terminating equipment including a plurality of telephones designated, e.g., as 20, 80. Although telephones are illustrated as the pieces of terminating equipment in Fig. 1, those skilled in the art will understand that such pieces include other telecommunication devices such as facsimile machines, computers, modems, etc.

Pursuant to the preferred embodiment, each active calling line in an AIN is assigned a ten digit calling line number. In the description of the present invention, the term "calling line number" is used in its generally understood meaning to be the number which is dialed or input by a caller or source to reach a piece of terminating equipment on a calling line associated with the dialed calling line number. A calling line number is commonly referred to as a telephone number or a directory number.

Referring again to Fig. 1, SSPs are interconnected by a plurality of trunk circuits. These are the voice path trunks that interconnect the SSPs to connect communications. The term "communication" or "call" is used herein to include all messages that may be exchanged between caller and called party in the network illustrated in Fig. 1. Each of the SSPs 30, 70 is connected to another type of AIN element referred to as a local signal transfer point (STP) 24 via respective data links 29. Currently, these are data links employing a signaling protocol referred to as Signaling System 7 (SS7), which is well known to those skilled in the art. Much of the intelligence of the AIN resides in yet another type of AIN element referred to as a local service control point (SCP) 50 that is connected to STP 24 over an SS7 data link. Among the functions performed by the SCP 50 is the maintenance of network databases and subscriber databases. These databases may be used in providing temporary telecommunication services to a customer. Typically, the SCP 50 is also the repository of

service package applications (SPAs) 35 that are used in connection with or as part of the databases in the application of telecommunication services or enhanced features to calling lines.

In order to keep the processing of data and calls as simple as possible, a relatively small set of triggers is defined as the SSPs for each call. A trigger in the AIN is an event associated with a particular calling line that generates a packet to be sent to an SCP. The trigger causes the SCP to query its database for processing instructions with respect to the particular call. The results of the database inquiry are sent back to the SSP in a response from the SCP 50 through STP 24. The return packet includes instructions to the switch as to how to process the call. The instructions may be to take some special action as a result of a customized calling service or enhanced feature. In response, the switch moves through its call states, collects the called digits, and generates further packets that are used to set up and route the calls. Similar devices for routing calls among various local exchange carriers are provided by regional STP and regional SCP.

The AIN may also include a service circuit node 32 (SCN), which may also be referred to herein as a service node. The SCN 32 includes voice and dual tone multi-frequency (DTMF) signal recognition devices and voice synthesis devices. In addition, the SCN 32 may include a data assembly interface. The SCN 32 is connected to the local SCP 50 via data link using an X.25 protocol. In addition, the SCN 32 typically is connected to one or more (but usually only a few) SSPs via Integrated Service Digital Network (ISDN) links.

Thus, each telephone set (e.g., caller 20 and subscriber 80) is connected via a telephone line 15 (e.g., POTS, or similar) to a telephone system including central office switches 30, 70, at least one SCP 50, and an optional remote voice messaging system 90. The SCP 50 contains control logic and feature data, and is a centralized node in the system. A SPA 35 processes calls and is running on the SCP 50. Each central office switch 30, 70 may be connected to a

plurality of subscriber sets. Additionally, the SCP 50 may provide routing instructions to a plurality of central offices. Connections 29 between the central offices 30, 70, the service control point 50, and the voice messaging system 90 are preferably TCP/IP high speed network connections (e.g., fiber optic, ethernet, etc.).

The caller 20 dials a number that is transmitted to its associated central office (the originating central office 30) in a conventional manner. The central office 30 detects the caller's instructions and requests a call setup to the subscriber's central office (the terminating central office 70) via a service control point 50 in a conventional manner.

After receiving the incoming call connection request, the terminating central office 70 determines if the DND subscriber feature in accordance with the present invention is activated for the subscriber 80. If the DND feature is not activated, the call is connected in a conventional manner. If the DND feature is activated, the caller 20 is prompted to enter an access code or a PIN, typically via a keypad at the caller's telephone. More particularly, it is contemplated that an AIN trigger is placed on the subscriber's line. When any caller 20 dials that number, the call is sent to an AIN service control point 50. An application, such as a service package application 35, that resides on the service control point 50 or separately, instructs the AIN end office (i.e., the originating central office 30) to prompt the caller with a message requesting the code (e.g., a prerecorded announcement or a synthesized voice, generated by a voice synthesizer, stating "The person you are calling is currently accepting only verified calls. Please enter the PIN code to continue."). Conventional voice recognition techniques and apparatus may be used to accept and analyze an audible access code, such as a spoken access code, PIN, or password.

The present invention checks the caller to determine if he has an authorizing code, such as PIN, to allow his call to go through. A list of authorized access codes or PINs is stored in a storage device, such as a memory, that can reside

within the telecommunications network (e.g., at the service control point 50, in the receiving central office 70, or separately). Preferably, a predetermined PIN code for the subscriber, e.g., four digits, is stored in an AIN database 40 in the service control point 50.

If the caller 20 enters an access code or PIN that is on the list of authorized access codes or PINs residing in the database 40, then the call is established with the subscriber's phone 80. If the caller 20 does not enter an authorized code, then the system hangs up, or optionally, sends the caller 20 to the subscriber's voice mail box that can reside, for example, in a remote voice messaging system 90. The caller 20 can be prompted multiple times for a correct access code before the system hangs up or sends the call to an alternate destination, such as the voice messaging system 90.

It should be noted that during the period when the DND subscriber feature is activated, outgoing calls will be unaffected.

Fig. 2 shows a flow chart of an exemplary method of operation of the system of Fig. 1 in accordance with the present invention. At step 100, the caller dials the telephone of the subscriber's telephone. At step 110, an AIN (advanced intelligent network) trigger (e.g., a Terminating Attempt Trigger ("TAT")) fires on the terminating central office 70. The terminating central office 70 passes control to the service control point 50.

At step 120, assuming the DND subscriber feature is activated, the SCP 50 accepts the query and sends control to an SPA 35 that processes the call as follows. If the DND feature is not activated, the call is placed in a conventional manner. At step 130, the SPA 35 directs the originating central office 30 to play a prompt requesting the code from the caller 20; e.g., "Please enter the do not disturb override code for the subscriber you are attempting to call." Following completion of the prompt, the SPA 35 directs the originating central office 30 to collect the digits of the access code or PIN (e.g., a predetermined number of dual tone multi-frequency

("DTMF") signals, representing a predetermined number of depressed keys on a telephone keypad) from the caller 20. After the digits (signals) are collected, or a timeout is reached, control is passed back to the SPA 35 along with any digits collected.

At step 140, the SPA 35 analyzes the collected digits and determines if the caller 20 entered the correct digits. More particularly, the SPA 35 compares the collected digits to the access code(s) stored in the database 40 that preferably resides within the SCP 50. If the incoming caller 20 entered authorized correct do not disturb override digits for the subscriber 80, then at step 150, the SPA 35 passes control of the call to the terminating central office 70, which rings the subscriber's telephone 80. If the entered digits are incorrect, or if none are entered after a predetermined time, then the call is terminated at step 160. For example, the caller hears an announcement stating that the caller is not accepting calls (e.g., "I'm sorry, but this number has been marked as do not disturb".). Alternatively, the caller is given another chance to enter the digits, or the caller is automatically transferred to an alternate destination, such as a voice messaging system 90. Alternately, the caller 20 may be given the option of directing the call to the alternate destination or voice messaging system 90.

It is contemplated that instead of collecting and analyzing digits (e.g., DTMF signals) of the access code or PIN from the caller 20, as described above, the originating central office 30 and SPA 35 can use conventional voice recognition techniques and apparatus to accept and analyze an audible access code from the caller 20, such as a spoken access code, PIN, or password.

It should be noted that a database query is only performed when the SPA 35 is analyzing the code entered by the caller 20. Thus, if the DND feature is not activated, or if the caller 20 does not enter a code, a database query is not performed. This saves processor time and expense, leading to a more efficient and less expensive DND subscriber feature.

The DND subscriber feature of the present invention can be activated / deactivated manually by the subscriber or automatically. For manual activation / deactivation, the subscriber can, for example, dial an access code (e.g., *99) on his home phone. Deactivation is accomplished by dialing the access code again, similar to a toggle switch, or alternatively, by letting a predetermined amount of time elapse (e.g., deactivate after 5 hours) or at a predetermined time (e.g., deactivate at 9 a.m.). Alternately, the service can be activated and deactivated automatically, according to pre-set conditions, such as times on a time of day list (e.g., activate at 11 p.m., and deactivate at 9 a.m. to avoid getting wrong number calls or solicitors in the middle of the night). Moreover, the time of day list can include particular days (e.g., Mondays, weekdays, weekends, or the like) in addition to times of day that the DND subscriber feature is to be activated. These time periods can be stored in the database 40 or other storage locations. In this manner, the subscriber 80 does not have to manually turn on and off the DND feature at the times he would like the service to be activated / deactivated. Preferably, the subscriber designates the authorized access code(s) and any activation / deactivation time periods and other commands through DTMF input using his telephone, using a menu driven DTMF response system. These time periods or range of times (start and end times) in which the DND subscriber feature will be in effect are selectable by the subscriber preferably when he dials the access code, or another system number, to activate or deactivate the feature.

The same PIN can be used for each caller 20, each caller can have a different PIN, or different groups of callers can have associated PINs. In this way, a subscriber can have greater control over those who have access to an authorized PIN. For example, the subscriber 80 can have one access code for his "permanent" access callers, and another access code for "temporary" access callers. When the subscriber 80 wants to stop providing access to his temporary access callers, he can change or eliminate that particular code, while maintaining the

code for the permanent access callers.

Another embodiment of the present invention is directed to a system and method that presents a caller 20 with an announcement that provides options as a prompt (e.g., "Press 1 for Sales, Press 2 for Marketing" or "Press 1 for John, Press 2 for Sally"). After the caller chooses an option, the call is passed to a "ringmaster" number that has been pre-provisioned to dial the subscriber's actual number. Thus, a subscriber can set up different codes that ring to different numbers responsive to the code entered by the caller. Alternately, the different codes could ring the phone in a different manner for each code. For example, if the caller entered "1" as the code, the phone would ring conventionally (e.g., one long ring), and if the caller entered "2" as the code, the phone would give two short rings instead. In this manner, the subscriber would be able to determine who the call is for responsive to the type of ring.

The invention may be embodied in the form of appropriate computer software, or in the form of appropriate hardware or a combination of appropriate hardware and software without departing from the spirit and scope of the present invention. Further details regarding such hardware and/or software should be apparent to the relevant general public. Accordingly, further descriptions of such hardware and/or software herein are not believed to be necessary.

Although illustrated and described herein with reference to certain specific embodiments, the present invention is nevertheless not intended to be limited to the details shown. Rather, various modifications may be made in the details within the scope and range of equivalents of the claims and without departing from the invention.

What is claimed:

1. A method for establishing a call connection between a calling party and a subscriber, comprising:

receiving an incoming call request from the calling party to the subscriber at a central office associated with the subscriber;

determining that a predetermined access code is needed to complete the call connection;

prompting the caller to provide an access code;

receiving the provided access code from the caller;

comparing the received access code to the predetermined access code; and

establishing the call connection if the received access code corresponds to the predetermined access code.

2. The method according to claim 1, further comprising rejecting the incoming call request if the received access code is not identical to the predetermined access code.

3. The method according to claim 1, further comprising establishing a call connection between the calling party and an alternate destination if the received access code is not identical to the predetermined access code.

4. The method according to claim 3, wherein the alternate destination is a voice messaging system.

5. The method according to claim 1, further comprising establishing the call connection if it is determined that a predetermined access code is not needed to complete the call connection.

6. The method according to claim 1, wherein receiving the access code from the caller comprises receiving at least one dual tone multi-frequency (DTMF) signal.

7. The method according to claim 1, wherein receiving the access code from the caller comprises receiving an audible code.

8. The method according to claim 1, wherein determining that a predetermined access code is needed to complete the call connection is responsive to an advanced intelligent network (AIN) trigger firing on the central office associated with the subscriber.

9. The method according to claim 1, further comprising retrieving the predetermined access code from a storage device prior to comparing the received access code to the predetermined access code.

10. A method for controlling call processing between a calling party and a subscriber in a telecommunications network, comprising:

setting a do not disturb subscriber feature at a central office associated with the subscriber;

setting at least one predetermined access code that is needed to complete a call connection from the calling party to the subscriber;

activating a trigger corresponding to the do not disturb subscriber feature and responsive to an incoming call request from the calling party to the subscriber; and

transmitting a prompting message requesting an access code to the caller responsive to the trigger.

11. The method according to claim 10, further comprising:

receiving the access code from the caller;

comparing the received access code to the predetermined access code; and

establishing the call connection if the received access code corresponds to the predetermined access code.

12. The method according to claim 10, wherein setting the at

least one predetermined access code comprises receiving from the subscriber at least one dual tone multi-frequency (DTMF) signal from the subscriber and storing the received DTMF signal in a storage device.

13. The method according to claim 10, wherein the trigger is an AIN trigger.

14. A system for establishing a call connection between a calling party and a subscriber within a telecommunications network, comprising:

a first central office for receiving an incoming call request from the calling party to the subscriber, the first central office being associated with the subscriber;

a storage device for storing at least one predetermined access code;

a controller for determining that a predetermined access code is needed to complete the call connection, and for prompting the caller to provide an access code; and

a second central office for receiving the access code from the caller,

wherein the controller establishes the call connection if the received access code corresponds to the predetermined access code.

15. The system according to claim 14, further comprising an alternate destination, the controller establishing a call connection between the calling party and the alternate destination if the received access code is not identical to the predetermined access code.

16. The system according to claim 15, wherein the alternate destination is a voice messaging system.

17. The system according to claim 14, wherein the controller establishes the call connection if a predetermined access code is not needed to complete the call connection.

18. The system according to claim 14, wherein the received access code comprises at least one DTMF signal.

19. The system according to claim 14, wherein the received access code comprises an audible code.

20. The system according to claim 14, wherein the controller determines that the predetermined access code is needed to complete the call connection responsive to an AIN trigger firing on the first central office.

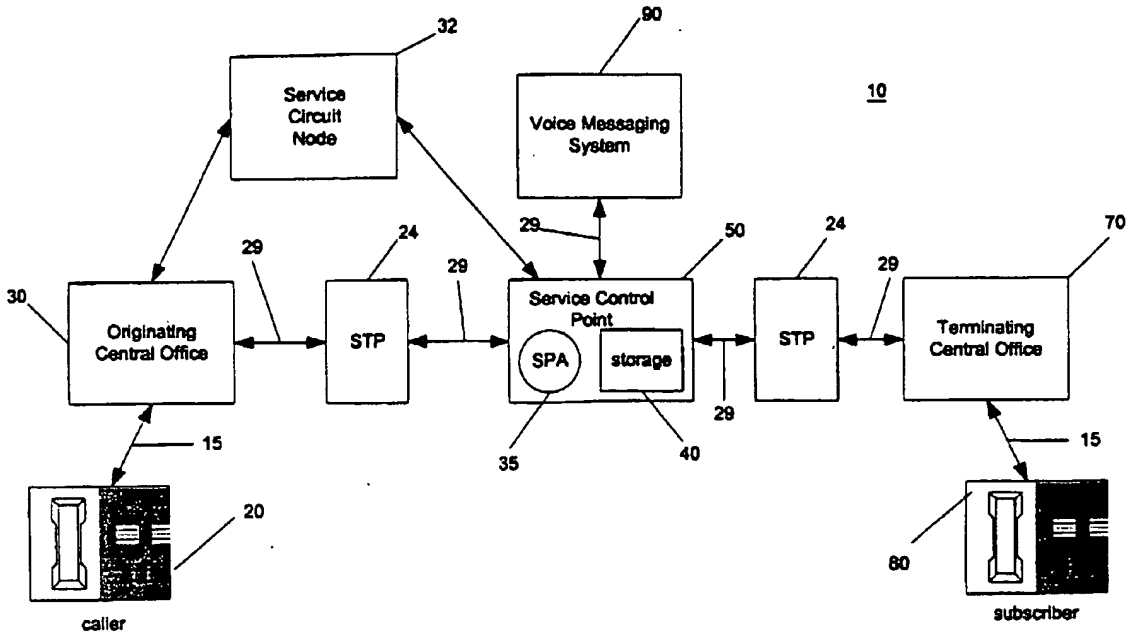
32
90
Service Circuit Node
Voice Messaging System
10
29
24
50
24
70
29
29
29
30
Originating Central Office
STP
Service Control Point
SPA
storage
STP
Terminating Central Office
29
15
15
35
40
20
60
caller
subscriber

FIG. 1

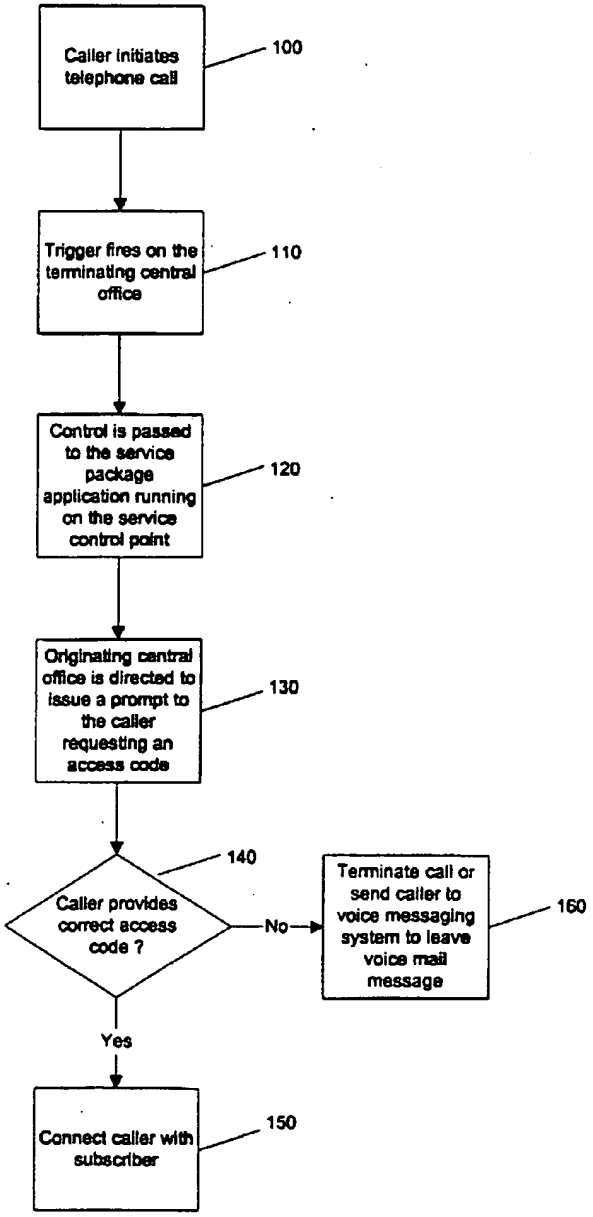
Caller initiates telephone call
100
Trigger fires on the terminating central office
110
Control is passed to the service package application running on the service control point
120
Originating central office is directed to issue a prompt to the caller requesting an access code
130
Caller provides correct access code ?
140
No
Terminate call or send caller to voice messaging system to leave voice mail message
160
Yes
Connect caller with subscriber
150

FIG. 2